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Dynamics of fractures growth in oil saturated carbonate beds of the Republic of Tatarstan

Khramchenkov M., Korolev E.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Tectonic cracks in oil-bearing carbonate sections of the Bashkirian stage of the Republic of Tatarstan were studied. Regularities in the development of cavities of cracks in dense limestones of fluids have been established. An experimental study of the morphology of cracks was carried out. Fissured channels are characterized by varying degrees of openness, twisting outlines, frequent intersections with each other. Some of them are complicated by blowing up the slit-like cavities of leaching. Cracks along their entire length are made with oxidized hydrocarbons. Above the section, the degree of fracture of carbonate rocks is reduced to 1-2 pieces per running meter. Their apparent extent does not exceed 10 cm. The fact of the change in the character of the distribution of cracks in the carbonate massif was theoretically confirmed, depending on the magnitude of their expansion on the nature of the regime of water flow in these cracks. The moderate nature of the flow, in which the flow regime is laminar, leads to a normal distribution of fractures along the transverse dimension (opening). The change in the nature of the flow and the transition to turbulent regime cause a change in the character of the crack distribution in size - it becomes lognormal. An expression is obtained for the dependence of the filtration flow through a system of cracks with dissolving walls (variable opening) versus time. The obtained dependence is compared with the experimental data known from the literature. Good agreement between the calculated and experimental data was demonstrated. The relationships obtained in the work on the basis of modeling can be used to predict the growth of the absolute permeability of the carbonate rock massif in the course of geological evolution or by using enhanced oil recovery methods that lead to a change in hydro-geochemical equilibrium in the water-rock system.

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Keywords

Carbonate beds, Fracture dynamics, Tectonic fractures

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